

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of )  
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Amendment of Part 101 of the Commission's Rules to )  
Facilitate the Use of Microwave for Wireless Backhaul )  
and Other Uses and to Provide Additional Flexibility to )  
Broadcast Auxiliary Service and Operational Fixed )  
Microwave Licenses )

**COMMENTS OF WIRELESS STRATEGIES INC (WSI).**

Re: Amendment of Part 101 of the Commission's Rules to Facilitate the Use of  
Microwave for Wireless Backhaul and Other Uses and to Provide Additional  
Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave  
Licenses, WT Docket 10-153

Dear Ms. Dortch:

**I. Introduction**

In our comments, WSI will focus on the two goals of the NPRM:

1. Protect incumbent licensees from harmful interference.
2. Increase the flexibility, capacity, and cost-effectiveness of microwave bands.

This NPRM holds the promise for the Commission to allow the FS microwave industry to make a quantum leap from the 1970's into the 21<sup>st</sup> century, dramatically lowering the cost of broadband backhaul and access, and dramatically increasing the effective use of spectrum, all without increasing harmful interference to existing licensees and future applicants.

The benefits would include:

- Increasing the effective use of spectrum by well over ten times.
- Decreasing the cost of backhaul and access by ninety percent.
- Making it economically viable to bring low cost mobile, enterprise and residential broadband access to un-served and underserved communities.
- Lowering the cost of healthcare through the use of telemedicine via high quality, low cost licensed microwave.
- Increasing the size of the market for licensed microwave products and services by several hundred percent.
- Increasing jobs in R&D, manufacturing, path engineering, site construction, etc.

Over the past three years there has been more innovation in the use and applications of mobile microwave spectrum and equipment, than has occurred in FS microwave in the last thirty years. Hand held mobile microwave devices have gone from being a mobile extension of land line Plain-Old-Telephone-Service (POTS) for voice, requiring symmetrical speeds of a few kilobits per second, to being powerful information devices supporting a plethora of applications requiring asymmetrical speeds of several megabits per second and new LTE and WiMax technology base stations. Meanwhile, fixed microwave networks are still being deployed using the same basic technologies of the 1970's.

Since the 1970's the market need for fixed wireless has changed from being primarily voice (connecting a central office to a central office or a central office to a first or second generation cell site, both over many miles) to asymmetrical Ethernet (for 3/4G base station backhaul, broadband enterprise services, smart grid and telemedicine applications). However, although the market need has changed, the provisioning of licensed services has remained unchanged, using symmetrical FDD with individual point-to-point links.

The Commission has long been committed to promoting innovation, and the Commission's proposed amendments to Part 101 of the Rules will enable innovative equipment manufacturers and service providers to open up significant new backhaul, enterprise and other markets, by allowing them to innovate and provide high quality, low cost and spectrum efficient products and services.

In the bands below 13GHz the market for Point-To-Point (PTP) FDD, Point-To-Multi-Point (PTMP) FDD-TDMA, FDD-FDMA and TDD-TDMA equipment and for innovative smart and dumb antennas would be increased by several hundred percent, and all without any new spectrum assignments.

## **II. Comments**

### **NOTICE OF PROPOSED RULE MAKING.**

#### **A. Making Additional Spectrum Available for Part 101 FS Operation.**

Spectrum is technology and application neutral. Past reasons for exclusive use of spectrum were due to the limited ability of the technology of the day to maximize the use of the spectrum. Today and into the future, there will be an ever increasing need for spectrum for new applications and, as suitable spectrum is a finite resource, an ever increasing need to maximize the use of that spectrum. Therefore, WSI is in favor of making spectrum available to all forms of operation when the necessity and technology make the band a good candidate for such operation.

#### **B. Elimination of the "Final Link" Rule.**

The Commission has a good record in promoting innovation and encouraging the effective use of spectrum. For example, in 1996 when the Commission simplified and streamlined the Part 101 rules to "encourage more efficient use of microwave spectrum by permitting more intensive use

of microwave equipment," and to "lead to economies of scale in microwave equipment production and lower equipment prices to licensees." WSI commends the Commission for reviewing the rules and including the "final link" rule in this NPRM. Quoting the Commission: "In the light of recent technological and regulatory developments, we believe the "final link" rule may no longer serve a useful purpose and, in fact, may inhibit the full use of Part 101 spectrum."

WSI suggests that when considering a rule change the Commission give as much regulatory leeway as possible to allow for future innovations while preserving the integrity of existing users operating under the rules.

### **C. Adaptive Modulation**

WSI agrees with the proposed changes to the Rules to allow FS licensees to use equipment that, through adaptive modulation, can maintain communications when adverse propagation characteristics would otherwise force communications to be terminated.

The concern that the use of adaptive modulation would allow for inefficient, low data rate usage part of the time is misplaced because equipment with adaptive modulation will always operate at the maximum spectral efficiency and only move to lower modulation schemes in order to maintain communication during adverse propagation conditions. Therefore, a system with adaptive modulation will transmit more data over a path over a given time than a system without adaptive modulation. Said another way, an adaptive system inherently has a higher average data transfer rate than a non adaptive system.

### **D. Auxiliary Stations**

Para. 51.

As noted by the Commission in Paragraph 51, all antennas radiate (and receive) energy in all directions, requiring prior coordination. This means that around every licensed microwave station are locations where an attempt to coordinate another station would fail, as the proposed station would either cause or receive harmful interference to and/or from the licensed path. Although these locations could be used by the existing licensee, they traditionally have not and therefore the spectrum has been used ineffectively; in short, it has been wasted. However, the Commission's proposed use of auxiliary stations around licensed microwave stations would mean that the "wasted" spectrum could be put to productive use, making it possible for licensees to dramatically increase the effective use of spectrum.

Para. 52, First bullet.

WSI is in complete agreement as this is how the coordinated side-lobe radiation is put to constructive use.

Para. 52, Second bullet.

WSI agrees and commends the Commission for not specifying how the requirement is achieved, thereby allowing industry to develop the most innovative solution using today's and tomorrow's technologies.

Para. 52, Third bullet.

WSI agrees. Secondary status will correctly reward licensees who optimize the use of their authorized spectrum by using the most advanced products with the best performance and optimizing the deployment parameters such as: auxiliary station location, antenna pattern, antenna size and cost, EIRP, etc. Through the use of innovative technology and good engineering practices, an auxiliary station can be designed and located such that it will never cause harmful interference nor be subject to harmful interference (being protected by the primary stations).

Para. 52, Fourth bullet.

WSI agrees. The coordination process specified in Section 101.103 eliminates any concerns regarding interference.

Para. 52, Fifth bullet, first and second sentences.

WSI agrees that after coordination, the licensee of the main (primary) link would file applications to make major modifications to the main (primary) link license to add auxiliary stations and that in those bands where conditional authority is available, applicants could operate their auxiliary stations as soon as they complete the frequency coordination process and file their application with the Commission, subject to the usual conditions and exceptions to conditional authority.

Para. 52, Fifth bullet, third sentence.

WSI is against allowing main (primary) link licensees to file blanket applications to operate temporary auxiliary stations at multiple locations within specified geographic areas surrounding the associated main (primary) links, as this would waste spectrum and is unnecessary<sup>1</sup>.

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<sup>1</sup> Although the technology exists for auxiliary stations to incorporate automatic interference countermeasures so as to be deployable at any location around a primary station without causing or receiving harmful interference, it would require a rule making proceeding beyond the scope of this NPRM.

Para. 52, Sixth bullet.

WSI agrees, but recommends that the rule restricting auxiliary stations from communicating directly be made permanent, because in order for auxiliary stations to perform their function of increasing the effective use of spectrum, they must be pointed directly at and communicating with a primary station(s). WSI suggests that the following definition be added to Section 101.3 of the Rules:

*"Auxiliary Station:* A station, or stations, distributed around a licensed primary station's point of coordination and communicating with the licensed primary station on the same frequency but on a secondary basis."

Para. 52, Seventh bullet.

WSI agrees that by eliminating antenna standards and minimum path length requirements for auxiliary stations the smaller antennas would result in significant benefits, including: "Low cost to manufacture and distribute, less expensive to install, weigh less, need less structural support, cost less to maintain, and the modest weight and small size make them practical for installation at sites incapable of supporting large antennas -- including many rooftops, electrical transmission towers, water towers, monopoles and other radio towers -- and smaller antennas raise fewer aesthetic objections, thereby permitting easier compliance with local zoning and home owner association rules,"<sup>2</sup> and can dramatically lower antenna site lease charges.

Para. 52, Eighth bullet

WSI agrees that main (primary) links would remain subject to existing loading and path length requirements, while auxiliary stations would be exempt from the loading and path length requirements as this would allow licensed operators to deploy auxiliary stations to provide desired services to large numbers of locations at low aggregate data rates or a smaller number of locations at high data rates or a combination of the two. WSI believes that it is the loading on the licensed spectrum that is important and the point of measurement should be at the baseband cross-connection point between the land line interface and a licensed station's equipment interface.

Para. 52, Ninth bullet.

WSI agrees.

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<sup>2</sup> Report and Order, WT Docket No. 07-54.

Para. 53.

Auxiliary stations are subject to the same coordination protocols as licensed stations and are secondary, thereby eliminating interference concerns.

Para. 54.

(1) WSI believes that all authorized radiated energy (EIRP) should, wherever practical, be put to productive use. That is, when there is a need for service that could be provided through auxiliary stations making productive use of the heretofore wasted side-lobe radiation. WSI can see no valid reason why the licensee would not do so. For backhaul applications we would expect a licensed station's frequency to support one hundred 4G cell sites. For Tier 3 "Smart Grid" applications we would expect in excess of one thousand locations to be supported.

(2) The cost benefits of using auxiliary stations are universal and therefore we would expect universal deployment in urban and rural areas.

(3) Spectrum put to productive use through the use of auxiliary stations could be used in a plethora of applications including but not limited to: Tier 1, 2 and 3 "Smart Grid" applications, including connecting smart grid communication networks to thousands of homes; providing backhaul for 4G (and beyond) cell sites, "last-mile" connectivity to BTOP fiber, Telemedicine networks and broadband services to homes and businesses.

(4) The maximum distance limiting factors from a main (primary) station to an auxiliary station are the EIRP at the angle of operation, the path availability requirement, frequency band, location, terrain, channel bandwidth, antenna gain and receiver threshold. For the 6GHz and 11GHz bands the maximum distance from a licensed station to an auxiliary station for angles from 30 degrees to 270 degrees is about six miles.

(5) WSI believes the question should be: "How much more traffic is the authorized spectrum expected to carry with auxiliary stations compared to a single main (primary) link?" Through the use of auxiliary stations, a primary station's authorized spectrum's traffic load could be increased by at least 800% relative to a legacy main (primary) link's traffic load requirement.

Para. 55

Because operations in geographically licensed spectrum is unrelated to putting unused FS licensed spectrum to productive use, the issue is moot.

Para. 56

Like the Lower 6GHz band, the Upper 6GHz band is highly desirable due to its resistance to rain fades and the 30MHz wide bandwidths. As the use of auxiliary stations would increase the effective use in all FS bands, we see no reason why innovators should be prevented from increasing the effective use of spectrum in the Upper 6GHz band.

Para. 57

The concerns raised by commenters that auxiliary links would give applicants an incentive to propose main (primary) links with excessive power seems to be based on a status quo mindset, looking at how FS paths have been engineered in the past with equipment that was "dumb." WSI expects that innovative applicants will, in compliance with Section 101.113(a) of the Commission's Rules, design "smart" main (primary) links with the minimum amount of power necessary to carry out the communications desired. Therefore, WSI expects that the average EIRP of a legacy main (primary) link and the average EIRP of a smart main (primary) link will be about the same, with auxiliary link EIRPs averaging only one percent of that of the average power of the main (primary) link.

Regarding Section 101.103(d)(1) of the Commission's Rules, well engineered auxiliary stations are the most effective way to not only avoid, but to eliminate blocking the growth of prior coordinated primary systems.

Para. 58.

The regime proposed in the NPRM is:

1. Auxiliary stations must not cause any incremental interference to other primary links (existing or future).
2. Auxiliary stations must not cause any more interference to primary links than the main (auxiliary stations' primary) link would cause.
3. Auxiliary stations will be secondary in status and have no right to claim protection from interference from any primary stations, including stations in other services, such as BAS, CARS, and satellite stations, other than interference that violates the protection rights of the main (primary) link. Otherwise, auxiliary stations will have a right to claim protection only from later-deployed auxiliary stations.

This regime effectively restricts the locations of auxiliary stations. Tweaking of this regime would, at the very least, decrease the effective use of spectrum, unnecessarily eliminate services to un-served and underserved areas and stifle innovation.

## **NOTICE OF INQUIRY**

### **A. Modification of Efficiency Standards in Rural Areas.**

With advances in technology WSI believes it is both unnecessary and undesirable to lower spectrum efficiency standards in rural areas, especially as the equipment cost differential with and without adaptive modulation is insignificant. As demonstrated by the introduction of innovative technology in mobile microwave and in fixed microwave operating under Part 15 of the rules, the future of microwave technology is toward smarter and more adaptive equipment, and any modification to the rules should therefore be future looking and take future trends into account so as not to hamper innovation. By adopting a ruling allowing equipment with adaptive modulation to be used in Part 101 frequency bands, the Commission removes any necessity for waivers of Section 101.114(a) (3) of the Commission's Rules, as equipment under the rules have to be certified by the manufacturer to meet or exceed the mandated equipment efficiency standards and, in operation, will automatically adjust to the most efficient modulation for the path conditions so as to maximize the transfer of data over the path.

### **B. Review of Part 101 Antenna Standards.**

In Section 101.115 of the Rules the Commission wisely specifies the electrical requirements that must be met but not how the electrical requirements are to be met, thereby promoting innovation. As noted in this NOI, smaller antennas have several advantages for carriers and consumers; however, the advantages from the use of smaller antennas should not come at the expense of wasting spectrum, but should come from innovation. For example, this NPRM is proposing to allow the use of very small antennas on auxiliary stations (for example 1ft. antennas at 6GHz) without causing any interference to existing licensees or future applicants. Therefore, WSI strongly recommends that any revision to the antenna rules facilitate innovation as the means to promote more efficient and cost effective use of spectrum.

### **C. Increasing Flexibility Generally.**

Over the last several decades the Commission has done a good job in promoting innovation by specifying performance requirements without specifying how those requirements were to be met. Future technologies will be smart and adaptive and it is essential that the Commission allow smart, innovative entities to solve industry problems through innovation, and when a rule change is required, the Commission should minimize the time of the rule making process and, if requested, the time to issue a waiver of the rules pending a rule making.

## **III. Conclusion**

WSI believes that this NPRM holds the promise for the Commission to exceed the expectations of Section 5 of the National Broadband Plan by:

- Increasing the effective use of an FS licensed station's authorized bandwidth from hundreds of megabits per second to gigabits per second.



- Making it possible to increase the number of locations served in a heavily used frequency band (for example 6GHz in Los Angeles, CA) by hundreds of percent.
- Lowering the costs to provide broadband licensed backhaul and access in urban and rural areas by as much as ninety percent (90%).
- Spurring investment in innovative microwave technology.
- Increasing the market size for existing and innovative new products.
- Creating employment opportunities in R&D, manufacturing and construction.

And much more.

WSI looks forward to submitting reply comments.

Respectfully submitted

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